

CLAIMS

We claim:

1. A variable RF filter, comprising:
 - at least one filter element;
 - a fluid dielectric; and
 - a fluid control system for selectively moving said fluid dielectric from a first position, where said fluid dielectric is electrically and magnetically coupled to said filter element to produce a first filter response, to a second position, to produce a second filter response distinct from said first filter response.
2. The variable RF filter according to claim 1 wherein said filter element is formed from a structure selected from the group consisting of stripline, microstrip, and buried microstrip.
3. The variable RF filter according to claim 1 wherein at least one electrical characteristic of said filter response is changed when said fluid dielectric is moved from said first position to said second position.
4. The variable RF filter according to claim 1 wherein said electrical characteristic is selected from the group consisting of a passband, a stopband, a center frequency, a bandwidth, a quality factor (Q), and a characteristic impedance.

5. The variable RF filter according to claim 1 wherein said fluid control system includes a pump for moving said fluid dielectric between said first position and said second position.
6. The variable RF filter according to claim 5 wherein said first position is defined by a bounded region located adjacent to said filter element and said second position is defined by a fluid storage reservoir.
7. The variable RF filter according to claim 6 wherein said bounded region is bounded by at least one of a solid conductive material and a solid dielectric material.
8. The variable RF filter according to claim 1 wherein said fluid control system is responsive to a control signal for selectively moving said fluid dielectric between said first and second position.
9. The variable RF filter according to claim 1 wherein said fluid control system replaces said fluid dielectric with a second fluid dielectric responsive to a control signal.
10. The variable RF filter according to claim 1 further comprising a plurality of said filter elements, and said fluid control system selectively moves said fluid dielectric from a plurality of first positions, where said fluid dielectric is electrically and magnetically coupled to said filter elements, to a plurality of second positions.

11. The variable RF filter according to claim 10 wherein said fluid dielectric is magnetically and electrically decoupled from said fluid dielectric in said second position.
12. The variable RF filter according to claim 1 wherein an amount of said fluid dielectric in said first position is adjustable.
13. The variable RF filter according to claim 1 wherein said fluid dielectric is electrically and magnetically decoupled from said filter element in said second position.
14. A method for dynamically controlling a filter transfer characteristic of a variable RF filter, comprising the steps of:
 - producing a first filter transfer characteristic; and
 - responsive to a control signal, changing said first filter transfer characteristic to a second filter transfer characteristic different from said first filter transfer characteristic by moving a fluid dielectric from a first position where said fluid dielectric is electrically and magnetically coupled to at least one filter element of said variable RF filter, to a second position.
15. The method according to claim 14 further comprising the step of selecting a permittivity and a permeability of said fluid dielectric, and a filter geometry, to provide at least two desired filter transfer characteristics when said fluid dielectric is moved from said first position to said second position.

16. The method according to claim 14 further comprising the step of selecting said filter element structure from the group consisting of stripline, microstrip, and buried microstrip.

17. The method according to claim 14 further comprising the step of operating a pump to move said fluid dielectric from said first position to said second position.

18. The method according to claim 14 further comprising the step of selecting said first position to be a bounded region located adjacent to said filter element and selecting said second position to be a fluid storage reservoir spaced apart from said filter element.

19. The method according to claim 14 further comprising the step of selectively moving said fluid dielectric from a plurality of first positions, where said fluid dielectric is electrically and magnetically coupled to a plurality of said filter element, to a plurality of second positions.

20. The method according to claim 19, further comprising the step of magnetically and electrically decoupling said fluid dielectric from said plurality of filter elements in said second positions.

21. The method according to claim 19 further comprising the step of independently controlling said movement of said fluid dielectric between said first and second positions with respect to a plurality of said filter elements.

22. The method according to claim 13 further comprising the step of moving said fluid dielectric between said first and second positions to change at least one electrical characteristic of said filter selected from the group consisting of a passband, a stopband, a center frequency, a bandwidth, a quality factor (Q), and a characteristic impedance.

23. The method according to claim 13 further comprising the step of electrically and magnetically decoupling said fluid dielectric from said filter element in said second position.